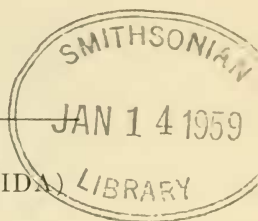


PROCEEDINGS  
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PILL MILLIPEDS (DESMONIDAE, POLYDESMIDA)  
IN THE UNITED STATES

BY NELL B. CAUSEY

*Fayetteville, Arkansas*

Earlier papers on the millipeds of the family Desmonidae in the United States are by Bollman (1888, 1893), Cook (1898), and Loomis (1943). These writers described one species from each of the states of Alabama, Arkansas, and Oklahoma. In this paper I have added records from seven other states and descriptions of two new species and one new subspecies. The type specimens will be deposited in the American Museum of Natural History.

I am greatly indebted to Dr. David Causey, who aided in making most of the collections, and to Mr. Walter Harman, Dr. D. L. Wray, and Dr. M. L. Sanderson, for one collection each.

Millipeds representing two genera of the family Desmonidae are known from the southern United States. *Desmonus carlei*, with 20 body segments, has been collected from an area that extends from southeastern Kentucky through eastern Tennessee, Georgia, Alabama, and into western Florida. Another species with 20 body segments, *Desmonus pudicus*, is known from a limited area from central Arkansas; and two species, each with 19 body segments, occur in western Arkansas and adjacent areas of Missouri, Texas, and Louisiana. The monotypic genus *Desmoniella* has been collected only in central Oklahoma. The family is probably much more widely distributed in the southern United States than the present records indicate.

I have collected these millipeds from a variety of habitats in either deep or sparse litter, on moss, or in decaying logs in hardwood, pine, and mixed forests. They have been found in two sites with other pill millipeds of the genus *Onomeris*, order Oniseomorpha.

*Key to the Desmonidae of the United States Based on  
Somatic characters of Mature Specimens*

- 1a. Lobes of the second body segment about as long and as broad as the lobes of the third segment; 19 body segments ..... *Desmoniella curta*
- 1b. Lobes of the second body segment much shorter and narrower than the lobes of the third segment; either 19 or 20 body segments ..... *Desmonus* 2

- 2a. 20 body segments ..... 3  
 2b. 19 body segments ..... 5  
 3a. Surface smooth, shining, without adhering mucus and soil particles; tubercles on segments 16 through 19 ..... *pudicus*  
 3b. Surface finely granular, with adhering mucus and soil particles; tubercles, either distinct or indistinct, on segments 4 through 20..... 4  
 4a. Segments 5 through 19 with prominent, erect, distinct tubercles.....  
       ..... *earlei earlei*  
 4b. Most tubercles indistinct; only on segments 17, 18, and 19 are they erect and distinct ..... *earlei mancus*, new subspecies  
 5a. Tubercles usually prominent and distinct on all segments from 5 through 18 or 19. Body moderately moniliform. ....  
       ..... *inordinatus*, new name  
 5b. Tubercles absent from all except the last three or four segments, where they are very small. Body very slightly moniliform .....  
       ..... *austrus*, new species

Genus **Desmoniella**

*Desmoniella* Loomis, 1943, Bull. Mus. Comp. Zool. Harvard, vol. 92, no. 7, p. 400 (*Desmoniella curta*).

This genus is very distinct from *Desmonus* in the shape of the lateral lobes of the second and third body segments and in the presence of lateral pits on only segments 4 through 10. The gonopods are similar in the two genera.

Genus **Desmonus**

*Desmonus* Cook, 1898, Proc. U. S. Nat. Mus., vol. 21, no. 1154, p. 463 (*Desmonus earlei*).

This genus is unusual in that some species have 19 body segments and others have 20. The body length is between 4.5 and 8.5 mm. The shape of the lateral lobes of the adult stadium is constant throughout the genus. The gonopods and the J-shaped third article of the first legs of the male are almost constant in shape throughout the genus. The lateral pits begin on segment 3 in all species and continue through the last segment in some species; in others it has not been possible to determine definitely where the lateral pits leave off. All species except *D. pudicus* have the body surface sparsely to thickly covered with mucus and soil particles. All species have tubercles on one or more segments. The tubercles are arranged in transverse series of from 6 to 12, with the one on either side of the medial pair always a little anterior to the others in the series. Tubercles may be conspicuous, erect, and conical, or they may be flattened and inconspicuous. Each tubercle has a seta at its apex.

The larvae lack mucus and have very few tubercles. The lateral lobes of the second segment are broader and longer than in the adult stadium, closely resembling the shape of those lobes in the last stadium of the genus *Desmoniella*.

*Desmonus earlei earlei*

*Desmonus earlei* Cook, 1898, Proc. U. S. Nat. Mus., vol. 21, no. 1154, 463-465, pl. 32, figs. 1a-1n (Auburn, Lee Co., Alabama).

The adult specimens in my collection conform closely to the descrip-

tion of the species. The larvae are smooth, shining, and with tubercles on only the last three or four segments.

New records: *Georgia*: DeKalb Co., Stone Mountain, 1 ♀, June 16, 1958; tubercles less conspicuous than observed in any other specimens of this subspecies: larvae, Sept. 14, 1954, D. L. Wray. Fulton Co., Bankhead Lake, 1 ♂, 2 ♀, June 16, 1958.

*Kentucky*: Bell Co., Pine Mountain State Park, 1 ♂, June 16, 1940. Whitley Co., Cumberland Falls State Park, 1 ♂, 1 ♀, larvae, June 17, 1940.

*Tennessee*: Campbell Co., Norris Park, 1 ♂, June 18, 1940.

#### *Desmonus earlei mancus*, new subspecies

Diagnosis: Differs from *Desmonus e. earlei* in the smaller size of the body, the degenerate tubercles, and shorter setae.

Description of female holotype: Body width 1.8 mm. In alcohol without color except the sparse patches of tan mucus. Surface of tergites unevenly granular. Segments 5 through 16 each with a transverse row of 8 or 10 very obscure tubercles, the position of each one marked by a short seta. Segments 17, 18, and 19 have more distinct, conical tubercles; on segment 19 the tubercles are nearly as large as on that segment of *D. e. earlei*. On the anal tergite there is a pair of low, irregular tubercles. Lateral pits can be seen distinctly on segments 3 through 16.

Type locality: *Florida*: Jackson Co., Florida Caverns State Park, 1 ♀, in moss on rock in dense woods at entrance to natural bridge, May 27, 1958.

Other record: *Georgia*: Polk Co., Highway 161, 9 miles west of Centerton, hardwood forest, 1 ♀, June 17, 1958. This specimen has light brown antennae; in all other characters it is like the holotype.

#### *Desmonus pudicus*

##### Figure 1

[*partim*] *Spheriodesmus pudicus* Bollman, 1888, Ent. Amer., vol. 4, p. 3; 1893, Bull. U. S. Nat. Mus., no. 46, p. 75 (Little Rock, Pulaski Co., and Okolona, Clark Co., Arkansas).

[*non*] *Desmonus pudicus* (Bollman). Cook, 1898, Proc. U. S. Nat. Mus., vol. 21, no. 1154, pp. 465-466, pl. 32, figs. 2a, 2b.

Restricted type locality: *Arkansas*: Pulaski Co., Little Rock.

In life the color is pink above, fading to cream below. In alcohol the pink fades quickly and narrow gray bands appear on the head, antennae, and across the tergites. Surface of tergites smooth and shining, without colored mucus and adhering soil particles. Segments 16 through 19 each with a transverse series of about 8 small tubercles. They are largest on segment 19 and progressively smaller on the preceding segments. Segment 20 and the segments anterior to 16 have no indication of tubercles except a single seta in the position that is occupied by each tubercle in the other species. Lateral pits on segments 3 through 20, very difficult to see on segments 14 through 20.

The gonopods (Fig. 1) are very similar to those of the other species of the genus except that the tibiotarsal region is slightly broader; the apical region of each of its two rami is divided into three minute divisions, which are rounded on the posterior ramus and acute on the lateral or anterior ramus.

New record: *Arkansas*: Pulaski Co., Sweet Home, mixed woods, 2 ♂,

6 ♀, many larvae, Dec. 22, 1949. This site is now occupied by a new housing development.

As discussed more fully in the section of *Desmonus inordinatus*, neither Bollman nor Cook realized that the two pill millipeds in Bollman's collection from Arkansas represent two different species. Bollman's description was based on the Little Rock specimen, which was lost before Cook studied the remaining specimen from Oklona.

***Desmonus inordinatus*, new name**

Figure 2

*Desmonus pudicus* (Bollman). Cook, 1898, Proc. U. S. Nat. Mus., vol. 21, no. 1154, pp. 465-466, pl. 32, figs. 2a, 2b.

Diagnosis: Similar to *D. earlei earlei* in the size of the tubercles; distinguished from that species by having 19 body segments instead of 20.

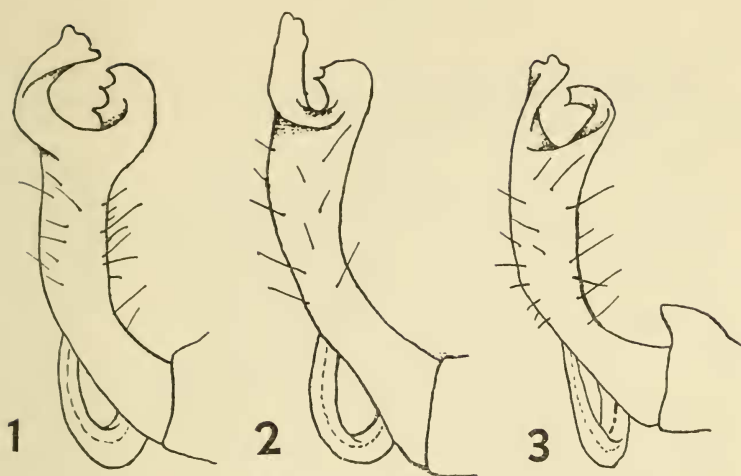
Type locality: *Arkansas*: Clark Co., Okolona.

Description of female holotype: Length about 6.5 mm. In alcohol the body is without pigment other than the abundant tan mucus and adherent soil particles. Surface of tergites finely granular. Beginning indistinctly on segment 4 and continuing much more distinctly on segments 5 through 18, each metatergite has a transverse series of 8, 10, or 12 tubercles. As in *D. earlei earlei* each tubercle has a seta at its apex, and the tubercles on each side of the middle pair in each series is somewhat smaller than those between which it stands and is slightly in front of them. Dorsal tubercles larger than the lateral ones in each series. On the 3 or 4 segments preceding the caudal segment the tubercles are acute and have a distinctly caudal slant. Caudal tergite with a pair of low, broad tubercles. Lateral pits on segments 3 through 13 easily seen; pits continue through segment 19.

In this species the gonopods (Fig. 2) are almost indistinguishable from others in the genus. The posterior ramus of the tibiotarsus is divided into three minute, rounded divisions, and the lateral or anterior ramus into two minute acute divisions.

Variations: The specimens from Clark, Pike, and Polk counties all have large, conspicuous tubercles. In collections made north of the Arkansas River, there is some variation in the tuberculation. Occasional specimens have very flat tubercles. Both strongly and weakly tuberculate forms may appear together in the same collection. Both forms are moderately moniliform, a character which easily distinguishes the weakly tuberculate form from the very weakly moniliform species *D. austrus*. In the following list of collections, all mature specimens have strong, conspicuous tubercles except those specifically mentioned as having degenerate tuberculation.

Records: *Arkansas*: Benton Co., Monte Ne, 1 ♀, Nov. 19, 1949; Cave Springs, larvae, May 8, 1951. Carroll Co., Lake Leatherwood, 1 ♂, 1 ♀, June 30, 1950. Clark Co., roadside park 4 miles east of Arkadelphia, hardwood forest, thin litter, gravelly soil, 2 ♂, 3 ♀, Sept. 11, 1950; 15 miles east of Okolona on highway 51, under cedar tree, 1 ♀, larvae, Sept. 11, 1950; Johnson Co., 1 ♀, tubercles degenerate, May 30, 1951. Newton Co., Compton, 1 ♀, tubercles degenerate, larvae, July 13, 1940. Pike Co., Antoine, mixed woods, sandy soil, 3 ♂, June 8, 1951. Polk Co., Rich Mountain, west side near summit, hickory forest, 1 ♂, Sept. 7, 1950. Sebastian Co., 3 miles north of Hackett, highway 71, thin oak litter, 1 ♀,



Explanation of Figures

Figure 1. *Desmonus pudicus* (Bollman), Sweet Home, Pulaski Co., Arkansas.

Figure 2. *Desmonus inordinatus*, new species, Fayetteville, Washington Arkansas.

Figure 3. *Desmonus austrus*, new species, Claiborne Par., Louisiana.

All figures are of the left gonopod, sublateral view, and are drawn to the same scale.

Sept. 1, 1950, Washington Co., numerous collections from Devil's Den State Park, Mount Sequoyah, West Fork, Farmington, Goshen, and Spring Valley; in most collections there are specimens with degenerate tubercles as well as specimens with very distinct tubercles. Conway Co., Petit Jean State Park, 1 ♂, 4 ♀, larvae, May 5, 1950.

Missouri: Barry Co., Mark Twain National Forest, oak-hickory forest, 2 ♂, May 3, 1951.

Bollman's collection which he named *Speriodesmus pudicus* consisted of two specimens, one from Little Rock and the other from Okolona. The male, which was designated as the type of the species, was subsequently lost; my specimens from Sweet Home, south of Little Rock, agree with its description. The female was therefore the specimen collected at Okolona; Cook found it in the United States National Museum and described it as follows:

Closely allied to the preceding [*D. carlei*], but distinct in the much less prominent elevations of the segments. The surface itself, however, seems to be rougher than in *D. carlei* and the adherent matter is more abundant, giving the creature a more uniform and darker color.<sup>1</sup>

<sup>1</sup>Cook (1898, p. 466)

Cook noted the discrepancy between his description of the female and Bollman's description of the male, but explained that it was due to the latter's description having been drawn partly from living material.



**Desmonus austrus**, new species

Figure 3

Diagnosis: Similar to *D. pudicus* in the almost complete absence of tubercles and in the weakly moniliform appearance; distinguished from that species by having 19 body segments instead of 20.

Type locality: *Arkansas*: Columbia Co., Magnolia.

Description of male and female syntypes: Length of male 5 mm., length of female 6 mm. Shape of lateral lobes as in other species of the genus. In alcohol the color is light tan. Surface of tergites slightly roughened, shining under the thin layer of mucus. The two or three segments preceding the caudal segment have four or six very small erect tubercles on the caudal margin. Segment 19 with a pair of low, irregular tubercles. All segments with a transverse series of about 12 short setae. Lateral pores on segments 3 through 19.

The gonopods are almost indistinguishable from those of *D. inordinatus*.

Variation: The specimens from Sevier county were pale pink when collected. Those from Cass county are the smallest seen, the length being about 4.5 mm.; they have no tubercles.

Records: *Arkansas*: Columbia Co., 4 miles east of Magnolia, mixed woods, deep litter, several of each sex, Dec. 22, 1949 (type collection); Lumber, 1 ♀, Dec. 22, 1949. Sevier Co., Wilton, 1 ♂, several ♀, larvae, Dec. 23, 1950.

*Louisiana*: Claiborne Par., about 5 miles south of Junction City, several of each sex, larvae, Dec. 24, 1949. *Lincoln* Par., 1 ♀, Oct., 1950, W. Harman. Winn Par., 1 ♀, June 11, 1951.

*Texas*: Cass Co., Linden, 2 ♂, Apr. 9, 1950, Smith and Berger.

*Desmonus* sp.

*Tennessee*: Sevier Co., Great Smoky Mountains National Park, larvae, June 21, 1940.